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Exploring the generative power of performance measurement systems design

Elena Giovannoni and Sonia Quarchioni

Abstract

Prior studies recognise the enabling power of incompleteness in the design of Performance Measurement Systems (PMS). We add to these studies by exploring the ‘time dimension’ of incompleteness as a way to delve into the generative power of design. To this aim, we rely upon the experience of a knowledge-intensive organization during the design of a new PMS. While knowledge complexity engaged the participants within an open-ended design process, incomplete measures were associated with unfolding memories of the past and confident beliefs in future solutions, which generated effects through the knowledge gaps that they entailed, as well as through the projections in the past and in the future that they enabled. By delving into the time dimension of incompleteness, we add to prior studies on PMS design by showing the relationships between managers’ hopes for the future, patterns of memory (and forgetting) of the past and incompleteness in design. In particular, we show that although incomplete measures stimulate managers’ aspirations and search for further possibilities, it is forgetting about the past (its evolving memories) that triggers this search, facilitates new actors entering the design process and enables unpredictable outcomes of design.

Key words: performance measurement, incompleteness, design, time, knowledge-intensive organization

1. Introduction

During the past decades, studies on the design of Performance Measurement Systems (PMS) have proliferated hugely (see, among others, Bol, Kramer, & Maas, 2016; Bourne, Neely, Mills, & Platts, 2003; Broadbent & Laughlin, 2009; Carlsson-Wall, Krauss, & Messner, 2016; Englund & Gerdin, 2015; Ferreira & Otley, 2009; Hoque, 2014; Wouters & Wilderom, 2008). These studies have highlighted a number of key features for PMS design, such as flexibility (Ahrens & Chapman, 2004), experimentation (Wouters & Roijmans, 2011), engagement (Chenhall, Hall, & Smith, 2017), participation (Abernethy & Bouwens, 2005; Groen, Wouters, & Wilderom, 2017), and user experience (Wouters & Wilderom, 2008).

In spite of these features, accounting scholars have emphasised the inherent incompleteness of PMS (Wouters & Wilderom, 2008) and the impossibility for these systems to fully capture all aspects of organizational performance through design (Hopwood, 1972). Such incompleteness may hinder the reliability of accounting information (Rowe, Shields, & Birnberg, 2012) and engage managers in a continuous search for repair (Ahrens & Chapman, 2004; Jordan & Messner, 2012). Furthermore, a number of studies have highlighted the generative and enabling power of ambiguous (Dambrin & Robson, 2011), incomplete (Busco & Quattrone, 2015), playful (Chenhall et al., 2017; Cooper, Hayes, & Wolf, 1981), or ‘semi-confusing’ (Hedberg & Jönsson, 1978) accounting information. These studies have suggested that incomplete measures can stimulate managerial action (Hall, 2010; Swieringa & Weick, 1987) and enable productive frictions (Chenhall, Hall, & Smith, 2013).

Along these lines, further research into accounting inscriptions has shown that incompleteness can be supplemented by a confident ‘belief in improvement’ (Quattrone, 2015, p. 428), which helps to overcome frustration and time-closure, while leading to ongoing innovation and search (Busco & Quattrone, 2018a; 2018b; Quattrone, 2015; 2017). Furthermore, accounting has been regarded as a ‘machination of a *future*’ (Mouritsen & Kreiner, 2016, p. 24 – emphasis added) through the hope that it creates (Busco & Quattrone, 2018a), and the promises (Gibassier, Rodrigue, & Arjaliès, 2018; Mouritsen & Kreiner, 2016) or aspirations that it entails (Busco, Giovannoni, Granà, & Izzo, 2018; Christensen, Morsing, & Thyssen, 2013). Such ‘machination’ has an enabling effect as it brings about the users’ commitment to engage with a world that has not been seen yet, while forgetting about an imperfect *past* (Mouritsen & Kreiner, 2016; Revellino & Mouritsen, 2015).

These findings suggest that memories of the *past* and aspirations about the *future* matter in researching and explaining the enabling, rather than constraining, power of accounting. Such memories and aspirations entail a ‘time dimension’ which is relevant to understand the very nature and unfolding outcomes of incompleteness in accounting design. Previous studies have acknowledged the importance of exploring time in accounting (see, e.g., Anderson-Gough, Grey, & Robson, 2001; Ezzamel & Robson, 1995; Giuliani & Skoog, 2017) and have emphasised the role of accounting in ‘producing’ (Quattrone, 2005; Quattrone & Hopper, 2005) and managing time (Mouritsen & Bekke, 1999; Nandhakumar & Jones, 2001). However, apart from few exceptions (see, e.g., Jordan & Messner, 2012), the time dimension of incompleteness has not received sufficient attention in the literature on PMS. In this paper, we explore this dimension as a way to delve into the enabling and generative power of incompleteness in PMS design.

To this purpose, we draw on the case of a knowledge-intensive organization that is operating in the animal care sector. Over the past years, the organization attempted to design a new PMS with the intention of addressing performance measurement problems and searching for ‘complete’ measures. However, during this search, the nature of the problems to be addressed through design changed, new initiatives were generated, and PMS design unfolded within an ongoing process of discovery. In this context, confident beliefs in future solutions and evolving memories about past decisions and intentions, as well as knowledge gaps triggered by incomplete performance measures, allowed individuals to identify new problems and continue crafting the PMS.

By drawing on accounting and organization literature on incompleteness, we add to prior studies on PMS design and incompleteness by showing that the ‘impermanent’ nature of the outcomes of design (Jelinek, Romme, & Boland, 2008, p. 319) is sustained by patterns of memory and forgetting about the past, as these patterns are associated with managers’ hopes in an always ‘better’ future solution. Although the impossibility for managers to design complete measures triggers the search for further possibilities, it is ‘forgetting’ about the past (i.e. its evolving memories) that sustains this search over time and enables unpredictable new discoveries.

In so doing, we also add to previous studies on accounting and time by illuminating the role of time as a dimension of accounting incompleteness. In particular, we show that PMS’s inherent incompleteness engages with evolving managers’ projections *both* in the past and in the future through unfolding memories, aspirations and the knowledge gaps (about a forgotten past or a future that is not fully seen yet) that these memories and aspirations entail.

The remainder of this paper is organized as follows. Section 2 reviews prior studies on incompleteness. By drawing on these studies, we emphasise the importance of exploring the time dimension of incompleteness by delving into how incompleteness engages with evolving visions of the past and future. Section 3 explains the research method and introduces the case study, which is then analysed in Section 4. The time dimension of incompleteness in PMS design is, then, discussed in Section 5. Section 6 summarises the key findings of the paper and outlines opportunities for further research.

2. The generative power of design and incompleteness

Next, we analyse organization (sub-section 2.1) and accounting (sub-section 2.2) studies which have emphasised the enabling rather than constraining power of incompleteness in design. By drawing on these studies, we argue that the generative effects of incompleteness can be related to the open-ended nature of design, as well as to the designers' or users' (incomplete) visions of the *present*, *past* and *future* throughout the design process.

2.1. Incompleteness in design

The organization literature has broadly acknowledged the generative power of incompleteness in design. For example, according to Weick (2004):

“regardless the direction in which designing moves [...] there is a sense that unfinished designs have more vitality than do finished designs. [...] Life persists when designs are underspecified, left incomplete, and retain tension” (p. 43).

From this point of view, unfinished designs open up opportunities for future possibilities, as they are interrogated differently by different actors. As argued by Garud, Jain, & Tuertscher (2008),

“designs, by definition, have to deal with incompleteness. However, rather than pose a threat, incompleteness acts as a trigger for action. Even as actors try to complete what has been left incomplete, they generate new problems as well as new possibilities that continually drive the design” (p. 352).

Along these lines, Jelinek et al. (2008, p. 319) emphasise that, by its very nature, organization design implies ‘impermanent outcomes’ rather than stable solutions (see also Boland & Collopy, 2004). This means that *designing* in organization is in constant re-design since outcomes are always temporary and never achieve closure. This idea is clearly illustrated by Simon (1996) through the oil painting metaphor:

“making complex designs that are implemented over a long period of time and continually modified in the course of implementation has much in common with painting in oil. In oil painting, every new spot of pigment laid on the canvas creates some kind of pattern that provides a continuing source of new ideas to the painter. The painting process is a process of cyclical interaction between the painter and canvas in which current goals lead to the new application of paint, while the gradually changing pattern suggests new goals” (p. 163).

In this metaphor, the purpose of design is always to ‘design more’, finding new ideas and patterns while carrying on the design process over time. This continuity also blurs the boundaries between the process of design (expressed by the verb ‘to design’ or ‘designing’) and outcomes (the noun ‘a design’). As the design process generates its outcomes, new patterns and new possibilities emerge, re-shaping the process of design itself while always leaving it incomplete (Garud et al., 2008; see also Ewenstein & Whyte, 2007; 2009; Kornberger & Clegg, 2003; 2004).

These studies suggest that incompleteness in design embeds a time dimension within which the incomplete outcomes of design (the ‘impermanent outcomes’ for Jelinek et al., 2008) always entail the possibility of designing more, projecting design into the future. However, such projection also implies evolving relationships with the past. For example, according to Weick (1977), it is by breaking the constraints of memory and past structures that individuals can find novel displays of prior actions, thus punctuating problems always in new ways. Similarly, March (1971) argued that memory can act as an enemy of ‘foolishness’ and, therefore, of creativity in design:

“For most purposes, good memories make good choices. But the ability to forget, or overlook, is also useful. If I do not know what I did yesterday or what other people in the organization are doing today, I can act within the system of reason and still do things that are foolish” (p. 263).

From this point of view, memory of the past can inhibit creativity by inscribing the design process into standard practices and stabilising the meaning of what is designed. However, memories may have a rather complex effect on design as their initial relation with objects changes (Garud et al., 2008; Guggenheim, 2009; Simon, 1996) and may allow the composition of new meanings (Quattrone, 2009; 2015). Thus, whereas memory links individuals to what is being designed, incompleteness in design may trigger a lack or adjustment of memories, which stimulates further searching and the composition of new knowledge.

Overall, the above studies suggest that incompleteness in design, as well as its generative power, entails evolving relationships with the *past* while enabling possibilities for the *future*. Next, we discuss the generative power of incompleteness in specific relation to accounting design.

2.2. Incompleteness in accounting

Early studies have highlighted the incomplete nature of accounting data (Hopwood, 1972). For instance, Hedberg & Jönsson (1978, p. 47) argued that accounting information often leaves space for ‘planned confusion’, where pluralism of voices and conflicting views are preserved rather than unified, experimental behaviours are encouraged rather than constrained and the outcome of design is always questioned rather than taken for granted. In so doing, accounting information allows to stimulate organizational curiosity and flexibility to cope with a changing environment.

By relying upon March (1971), Cooper et al. (1981) emphasised the role of ‘foolishness’ in accounting design. They argued that having slight faith in goals, leaving room for behaviours without no apparent good reasons, encouraging individuals to do things differently, treating memory as an enemy and experience as theory enable creativity and playfulness in “explaining past events and predicting future events” (Cooper et al., 1981, p. 188). These early studies highlighted that ambiguity and inconsistencies (Hedberg & Jönsson, 1978), but also foolishness (Cooper et al., 1981, drawing on March, 1971), may become relevant premises for experimentation and creativity.

Along these lines, other studies have emphasised the enabling power of incomplete accounting measures. For example, Swieringa and Weick (1987) argued that “analytically imperfect, biased accounting measures which can be viewed as misleading inputs to decision making, may sometimes stimulate forceful, sustained, self-validating action” (p. 294). More recently, Chenhall et al. (2013) recognised that imperfect accounts can generate a productive dialogue *because of* their imperfections (see, also, Hall, 2010). As highlighted by Quattrone (2017), rather than searching for tools of perfect representation, scholars should instead explore the power of incomplete and ambiguous accounting visualizations in prompting wise judgments and aiding decision-making.

However, accounting studies also recognise the risks and dysfunctional effects that, in certain circumstances, may be caused by PMS incompleteness (e.g. Ahrens & Chapman, 2004; Malina & Selto, 2001; Wouters, 2009), leading to unreliable information (Rowe et al.,

2012), lack of strategic fit (Melnik, Bititci, Platts, Tobias, & Andersen, 2014), and a continuous need for repair (e.g. Davila & Wouters, 2005; Lillis, 2002; Wouters & Wilderom, 2008). Still, as argued by Dambrin and Robson (2011), organizational actors can live with ‘imperfect numbers’ through the mechanisms of enrolment (or ‘making do’ according to Andon, Baxter, & Chua, 2007) triggered by such imperfection (see also Jordan & Messner, 2012).

Overall, prior accounting studies have suggested that incompleteness can take the form of ambiguous (Dambrin & Robson, 2011; Hedberg & Jönsson, 1978), imperfect (Chenhall et al., 2013), foolish (Cooper et al., 1981), playful (Chenhall et al., 2017), untrue (Doganova, 2011), unreliable (Rowe et al., 2012), or even ‘semi-confusing’ (Hedberg & Jönsson, 1978) information, which may hold generative power by engaging managerial action (Dambrin & Robson, 2011; Jordan & Messner, 2012; Swieringa & Weick, 1987), as well as triggering users’ dialogue (Chenhall et al., 2013; Hall, 2010) and search (Busco & Quattrone, 2018a; Quattrone, 2017).

However, incompleteness may also produce frustration and hinder innovation and learning, unless it is associated with structures of ‘hope’ (Busco & Quattrone, 2018a; Quattrone, 2015) in the *future*. In this regard, recent studies have emphasised that individuals’ belief into a ‘better’ future can replace the frustration caused by incomplete accounting representations. By relying upon the case of a medium-sized company in the fashion industry, Busco and Quattrone (2018a) show that, rather than causing frustration and inhibiting innovation, accounting incompleteness can prompt the ‘way ahead’ by embedding a desire for improvement and promise for perfection which is never achieved. It follows that the generative power of accounting incompleteness needs to be sustained by individuals’ hopes for (and beliefs in) a future ‘perfect solution’ which is, however, never fully realised.

Furthermore, as highlighted by Mouritsen and Kreiner (2016), structures of promise for future outcomes of decisions need to be grounded in both the memory of the promise itself, as well as in forgetting (and forgiving) past failures. Whereas accounting can certainly be regarded as a memory device for storing knowledge, as well as prompting interrogation, re-composing memory, and composing new knowledge (Quattrone, 2009; 2015), the inherent incompleteness of its representation also produces incomplete memories. As indicated by Mouritsen and Kreiner (2016, p. 23), “the memory produced by accounting has often been suggested to be incomplete in its representation, in its causality, and in the purposes or interests it serves”. Since the memory of the promise is necessary for the promise to stimulate

enabling effects, likewise, forgetting about an imperfect past is also needed in order to prompt action towards better possibilities (Mouritsen & Kreiner, 2016).

These studies suggest that structures of hope and aspirations in the *future*, as well as patterns of memory and forgetting of the *past* matter in order to understand the enabling, rather than constraining, power of accounting. By drawing on these studies we argue that the generative power of incompleteness entails a time dimension which aids in understanding when incompleteness leads to creative outcomes rather than inhibiting change and augmenting frustration. Next, we explore this argument in specific relation to incompleteness in PMS design. We do so by relying upon the case of Zootech, as explained in the following section.

3. Research method

3.1. Research design

This paper builds on a qualitative field study of a knowledge-intensive organization operating in the animal care sector (hereafter called Zootech¹). As emphasised by Ahrens & Dent (1998, p. 5), field study research allows exploring “the tensions which often develop around the use of accounting and the conflicting interpretations that give rise to them”. This is particularly important when researching how phenomena evolve over time, as well as individuals’ response to evolving conditions (Hopwood, 1987). More in general, the accounting literature recognises the potential that field research has to illustrate and explain accounting ‘in practice’ (see, for instance, Eisenhardt, 1989; Ryan, Scapens, & Theobald, 2002).

Since we were interested in exploring the effects of incompleteness in PMS, and particularly the time dimension of incompleteness, the field study approach enabled us to observe individuals’ attitudes towards performance measures during the design process as this process unfolded in practice. In so doing, our aim was not to provide generalised prescriptions on PMS design, but rather to grasp “the conceptual significance of diverse *images* that capture the ways in which accounting infuse action” (Ahrens & Chapman, 2006, p. 830 – emphasis added). In particular, we focused on incompleteness and its time dimension as our conceptual categories, (derived from the literature reviewed in Section 2), for capturing the way performance measures infused action and stimulated outcomes within Zootech during the PMS design.

¹ Zootech is a pseudonym used for reasons of confidentiality.

Knowledge-intensive organizations like Zootech provide an interesting setting for the purpose of this study because of the ‘knowledge complexity’ (Ditillo, 2004) of their value creation processes, which is likely to increase uncertainty and ambiguity, (and therefore incompleteness), in performance measurement and management. Zootech’s activities concentrate on the research, diagnosis, and treatment of animal transmittable diseases, providing diagnostic products and services, as well as technical support to individual customers, private companies, and public organizations. Such activities rely on intense R&D (Research and Development) supported by public funding. In addition, Zootech relies on the revenues generated by the sales of diagnostic products and services, as well as by the provision of customised treatments and highly specialised consultancies.

Similarly to other knowledge-intensive organizations (Ditillo, 2004), Zootech’s activities are grounded on highly differentiated expertise (in veterinary medicine, biology, chemistry, law and finance). Such heterogeneity challenges coordination mechanisms and a shared understanding of performance metrics, rendering it particularly interesting to explore ambiguity, dissonance and, therefore, incompleteness in PMS design within this specific setting. Also, the high level of environmental uncertainty and technical complexity faced by Zootech renders strategic planning and performance management particularly difficult in this field since planned outcomes and priorities may be challenged by unpredictable health emergencies (as we further explain in Section 4). For these reasons, Zootech provides a significant setting for exploring incompleteness in PMS design, given the high knowledge complexity and unpredictability that it faces.

In recent years, Zootech’s main strategy has been that of becoming a leading research and diagnostic centre internationally, while ensuring ongoing and prompt support to local customers and meeting their evolving needs. Therefore, the strengthening of core competencies (in different fields such as veterinary medicine, biology, and chemistry) and the maintenance of high reputation (in both research and service provision) are key strategic priorities for Zootech. Its wide range of activities are carried out through Administrative divisions and Health Management divisions. The divisions are managed by executive managers (EM) and each division is articulated into a number of Business Units (BU). Each BU is headed by a manager (BU manager – BM) who reports to the executive manager of the division that the BU belongs to.

Due to its hierarchical organizational structure, our initial access to Zootech was established through the General Director (GD), who was known by one of the researchers. When the first contact took place, the GD was interested in developing a new PMS for the

organization. Therefore, Zootech's experience provided us with a 'critical case', i.e. a case in which the research issues "are brought into focus by some critical event which raises those issues to the surface in the organization being studied" (see Scapens, 2004, p. 262). Given that we could follow the design process as it was unfolding, 'case time' and 'research time' coincided (Blazejewski, 2011, p. 256). Such closeness to the field was crucial in order to frame data, theory, and research problems into a 'plausible' fit (Ahrens & Chapman, 2006, p. 836; see also Baxter & Chua, 1998; Jönsson & Macintosh, 1997). In particular, since we could observe individuals' attitude towards performance metrics over almost two years, we could explore the role of memory during the design process, i.e. the evolving ways in which individuals related themselves to the metrics, and the intertwined relationships between incompleteness, memories of the past, and aspirations for the future.

3.2. Data collection and analysis

The field study started in January 2013, when the project for designing a new PMS was formally launched. Data for this study were collected between January 2013 and June 2014.

The main field evidence was collected through the direct observation of 21 meetings held at the organization's head office and concerned with the design of the new PMS (see Table 1 in the appendix). These meetings allowed us to acquire close proximity to the field by examining participants' discussions directly and in real time as they were unfolding (Atkinson & Shaffir, 1998). Each meeting lasted between 2 and 5 hours and was attended by an average of 15 managers from Health Management and Administrative divisions within Zootech. In total, during these meetings we met with 19 veterinarians, 5 chemists, 10 biologists, 8 administrative managers, as well as with the GD, the Administrative Director (AD), the Sanitary Director (SD), the Head of the Management Accounting (MA) unit and the Head of the Human Resources (HR) unit.

During the meetings, we focused on individuals' attitude towards performance measures and we took detailed notes to capture their different viewpoints. As most of the key arguments made during discussion were reiterated by participants (when they wanted to emphasise their perspective), we could annotate participants' actual dialogues in many occasions. To ensure accuracy, we took notes independently and compared them at the end of each meeting to check for consistency in the annotations.

In addition, we had access to a large number of internal documents (e.g., management accounting reports, plans and budgets, internal regulations, managers' presentations, etc.) and

we conducted 42 semi-structured interviews with 20 informants (see Table 2 in the appendix). Finally, a number of informal discussions during breaks in the cafeteria at Zootech's head office allowed us to obtain more 'candid' information (Van de Ven & Johnson, 2006, p. 813) and refine our understanding (Ahrens & Chapman, 2007). Most importantly, we kept a research diary where we recorded all main events shaping PMS design (Nadin & Cassell, 2006). This allowed us to reflect on our findings and on the chain of events.

Our data analysis followed three main phases of PMS design within Zootech: (1) January 2013 - March 2013, when managers' main matter of concern was the alignment between strategic priorities and performance management; (2) April 2013 - October 2013, when managers' main matter of concern was the coordination between different units of the organization; (3) November 2013 - June 2014, when managers' attention was focused on shared understanding and common language.

We grouped all data according to the three phases above. Within each phase, we identified the participants' main concerns on (and attitude towards) PMS incompleteness, the different problems that emerged during the discussion and all solutions and possibilities proposed by the participants. Then, we built up a plot (Czarniawska, 1998) between our theoretical constructs depicted in Section 2 and the individuals' attitudes and behaviours throughout the design process. By relying upon the literature reviewed in Section 2, we searched for the unfolding outcomes of PMS design, as well as the effects of the time dimension of incompleteness on these outcomes as individuals engaged with the design process. The results of this analysis are reported below.

4. The case of Zootech

4.1. Case background

Zootech's value chain covers all main areas of animal healthcare, from food security to the prevention, diagnosis and treatment of animal diseases. These areas combine standardised activities that are based on established protocols and procedures with the necessary extent of adaptation and variation required to face emergencies and specific contingencies, such as the unpredictable spread of new diseases. Given these emergencies, output planning, measurement and control can be challenging within Zootech due to the high level of environmental and technical uncertainty involved in the diagnosis of diseases and provision of treatments.

Furthermore, Zootech's core business strongly relies upon intense R&D activities. Such activities (from the search for funding to the final publication of research outputs) are aimed at delivering scientific research outputs whose quality is measured in terms of journal publications, international scientific recognitions and awards. In addition to growing reputation, R&D activities enable Zootech to provide more advanced solutions and treatments. Each R&D project is managed by a specific group of experts with highly differentiated knowledge and from various disciplinary backgrounds, depending on the nature of the project, and is assisted by administrative staff working in the Research unit of Zootech.

Similarly to other knowledge-intensive organizations (Ditillo, 2004), Zootech relies on highly sophisticated and differentiated knowledge to provide its products and services, ensure customer satisfaction and secure a competitive advantage. Many of its employees are 'experts', with a doctorate or other university degrees. Such level of expertise is necessary to face emergencies and offer effective diagnosis of animal diseases, as well as provide high quality research outputs.

As argued by Ditillo (2004, p. 409), "the more knowledge is differentiated among agents, the more it fosters interactions and triggers mechanisms for knowledge integration due to the multiplicity of ways the problems are perceived and dealt with". However, the presence of multiple specialised backgrounds within Zootech challenges communication between different groups of experts and creates struggles due to the coexistence of several ways of perceiving and dealing with the problems at hand.

It follows that, due to the very nature of its activities, Zootech faces various types of uncertainty related to the complexity of the research outcomes, the high unpredictability of the environment, the risk involved in the diagnosis and provision of treatments, as well as the high level of knowledge complexity.

Furthermore, Zootech faces the challenge of balancing the short-term requests and urgency of facing emerging diseases with the need to accomplish its long-term strategy of becoming a highly regarded international research centre. On the one hand, outstanding research outputs improve Zootech's reputation and thus help attract resources to invest in further operative and standard activities (by, for instance, acquiring new specialised diagnostic instruments). Also, progress in R&D improves the expertise necessary to ensure more effective diagnostic activities, thereby allowing Zootech to fulfil local customers' needs more efficiently. But, on the other hand, investing in R&D means fewer resources for dealing with urgent day-to-day customer requests. As a biologist commented:

“sometimes we are late to report the results of some research projects we have followed because of the pressing day-to-day work [...] They [long term research outputs and daily customer satisfaction] are both crucial but priorities change according to emerging needs” (EM2).

As we shall see next, the challenges described above stimulated uncertainty around the PMS, fostering an ongoing search for different possible solutions within Zootech.

4.2. Designing a new PMS within Zootech

“It does not matter if the controller’s report says that the number of analysis of my division did not meet the target! In the last three days I wasn’t able to sign and deliver any analysis because on Monday I was in Milan for a meeting, on Tuesday I left for Berlin to meet with some international partners involved in a research project on [...] and today I was part of a team group to solve some problems in our laboratory. Does this mean that in the last three days I did nothing strategic?” (EM1).

“On the one hand we perceive that all our initiatives are strategic, but on the other hand we need to understand on which initiative we should focus more and why [...]” (EM2).

In 2012, managers within both the Administrative and Health Management divisions expressed their concern on the information provided by the existing PMS. At that time, the strategic planning process and the resulting strategic plan within Zootech had a predominantly ‘narrative nature’, in which three-year strategic objectives (e.g., ‘strengthening the organization’s scientific reputation’) were translated into a number of strategic initiatives (e.g., ‘becoming a leading research centre’). However, BU managers’ performance was assessed against a set of Key Performance Indicators (KPIs), such as ‘reducing maintenance costs by 5%’ and ‘organizing 10 refresher training courses’ (see Figure 1), not explicitly linked to the strategic plan. Also, managers’ annual monetary bonuses were tied to only few indicators, while the others were linked to long term career and professional development patterns. Furthermore, whereas the strategic plan was developed through a top-down process, the definition of the KPIs for evaluating BU managerial performance followed a predominantly bottom-up approach without an explicit engagement in the overall strategy. It followed that BU managers had difficulty in establishing clear priorities between those indicators not linked to the bonuses, as such indicators did not have specific weights or priority ranking, and were not explicitly linked to the strategy. For instance, veterinarians

were often struggling to allocate priority between focusing on prominent research projects (leading to more resources for laboratories and increasing scientific reputation) and responding to all the numerous requests from local customers, while neither of the two sets of activities had a specific weight or link with the incentive system, but were both deemed strategic by Zootech’s strategic plan. With the specific purpose of clarifying the alignment between PMS and Zootech’s strategies, the GD decided that a major re-design of the existing PMS was needed.

Figure 1. A snapshot of the performance sheet with the KPIs for BU managers’ performance assessment (source: our translation and simplification from the organization’s material).

OBJECTIVES 2012

BUSINESS UNIT: xxx

HEAD OF THE BU: xxx

Objective	KPI	Target
1. ... (Professional development)
2. Increase n. of refresher training courses (Annual bonus)	N. of courses	≥10
3. ... (Professional development)
4. ... (Professional development)
5. ... (Professional development)

NOTES:

DATE _____ SIGNATURE _____

In January-February 2013, a team (hereafter labelled the ‘PMS team’) including the GD, the AD, the SD, the Head of the MA unit and the Head of the HR unit, held some meetings to review the strategies set in the 2013-2015 plan and identify a number of strategic objectives which could best guide managers toward the achievement of these strategies. Following these meetings, a number of strategic objectives were identified and represented in a map where they could be visualized altogether. Then, all Zootech’s managers indicated specific initiatives to put in place in 2013 in order to achieve the long-term goals. For each strategic objective an average of 3 short-term objectives and 15 performance indicators were identified and reported in an excel spreadsheet labelled ‘Zootech 2013’.

As commented on by the GD during a summit with all managers:
“this tree [Zootech 2013] is what we will be in the future and all the goals you see listed on that screen mirror your own proposals [...]”.

At this stage, the PMS was perceived as ‘complete’ in terms of being able to capture (or ‘mirror’ in the GD’s own words) all aspects of Zootech’s strategy and offer clear links between strategy and short term objectives and indicators. However, the GD announced a second phase of PMS design, in which all managers, (coordinated by the executive managers), would have the opportunity to propose specific numerical targets to drive the achievement of the annual objectives included in ‘Zootech 2013’. Also, a weighted set of these targets had to be linked to managers’ annual bonuses through an allocation of weights clearly coupled with the organization’s strategic priorities.

As we analyse next, as managers tried to identify specific targets, the knowledge complexity underlying some indicators was revealed and new problems unfolded.

4.3. Incompleteness, discoveries, and future projects

In April-May 2013, the PMS team organized a number of meetings with the executive managers (divided into two groups with a mixed composition of experts). During these meetings, managers were asked to reflect on performance indicators included in ‘Zootech 2013’ and propose targets. They were also informed by the PMS team that, whereas KPIs were all relevant for assessing managerial performance in general terms, in a further stage of design some of these indicators (more than one) would have to be selected and weighted to calculate managers’ annual monetary bonuses. As managers perceived that some of the new KPIs would have to be used for compensation purposes in a future stage, a number of critical issues emerged.

An example is provided by the indicator ‘response time’, i.e. the time elapsing from a request to a laboratory to the final release of the requested activity. This indicator was used to measure the achievement of the strategic objective ‘improve process efficiency’, which was crucial to ensure growing customer satisfaction. Although everybody agreed that this was a relevant indicator, the calculation of the targets involved a complex set of elements (e.g. number of samples, type of exams, level of priority and laboratories involved in the request). As highlighted by a veterinarian:

“response time depends on the relationship between different laboratories which need to align their activities and communicate with each other in a timely manner. For instance, the activity of [laboratory A] is the input for the activity of [laboratory B]. Thus, they must agree on the times and the procedures necessary to calculate the response time, especially when a sample is transferred between two or more

laboratories [...]. It can happen that the final response time is not reliable just because of managers' scarce coordination when reporting information. It could be avoided with more alignment between us" (EM3).

As discussion on targets unfolded, the indicator 'response time' appeared immediately as being very difficult to quantify for target setting purposes. Its resulting incomplete nature triggered the discussion among participants who began to focus on the information at their disposal in order to find an 'appropriate' formula. For instance:

"we should not take into account only the technical time of the analysis. What about considering the average time from [activity X] to the date of transmission of the analysis to [a laboratory]?" (EM9)

"We don't have a proper monitoring system to get the data. Instead, why don't we consider the average time from [activity Z] to [activity Y] and the urgency of the request?" (EM3).

As revealed by the conversations above, the managers' engagement was triggered by the technical complexity of the indicator, which provided them with the opportunity to bring into the discussion different points of view and experiences. Such engagement was also stimulated by the possibility for this indicator of being used for compensation purposes. However, instead of finding a reasonable solution for making the numbers work for them immediately and in practice, managers relied upon their doubts and dissension on the technical calculation of the target to postpone the problem to the future, projecting it into a broader matter of concern. This is demonstrated by the quotes below:

"the calculation of the response time is a fake problem. [...] If we want to finally achieve a shared definition of 'time', we must first confront each other on the different factors which affect the analysis we make in our laboratories" (EM10)

"We should conduct a census of all the analysis with the same characteristics in order to define a good proxy for the response time for each kind of analysis" (EM9)

"Yes, a census could be a good starting point but is not enough. It does not matter which analysis has the same characteristics of another one when my activity is late because I didn't receive the results from [laboratory C]. We can get a good proxy only if we first achieve a real coordination of the activities between all laboratories" (EM10)

"Ok, but then how we could overcome those glitches?" (EM11).

Following the discussion above, the managers ended up agreeing on a provisional formula to calculate the response time and noted it down in the excel spreadsheet. However, they also agreed that, to make the formula work, they had to first address a broader problem, i.e. how to ensure effective coordination and information exchange between the different divisions. A veterinarian (EM11) suggested that,

“let’s keep the indicator [on response time] open to be changed. Now, what do you think about creating a dedicated team?”

Instead of ‘repairing’ the indicator (Jordan & Messner, 2012) and finding immediate mechanisms to make it work (Andon et al., 2007), Zootech’s managers projected the search for those mechanisms over time and into the need to address a broader problem spanning outside the boundaries of the PMS, i.e. the need to ensure effective coordination between units.

Another example is provided by the discussion concerning the strategic objective ‘improve procurement process efficiency’, showed in ‘Zootech 2013’. While all managers agreed that ‘procurement time’ was a key indicator for this objective, the need to define a formula and related targets for this indicator triggered a confrontation between the managers.

“We all know that one of the main issues which needs to be handled to improve the efficiency of the process is about procurement time. What about considering the average time from the purchase proposal to the shipping order?” (the SD)

“The laboratories cannot afford to wait for days to receive the materials they asked for because the Purchasing unit is not aware of priorities between different purchasing needs” (EM3)

“It’s not totally their fault. A number of managers realise that the materials they need are out of stock overnight!” (the AD)

“We don’t have this information [the average time from the purchase proposal to the shipping order]. Moreover, I don’t think it’s useful without standard times that we can compare with. Instead, why don’t we monitor our relations with each supplier in order to leave room for improvements?” (the AD)

“This doesn’t allow us to concretely tackle the problem. [...] There is scarce communication between the administrative staff and the laboratories on this regard. [...] Anyway, we need time to think it over! Let’s go on and come back to it next time” (the SD).

The conversation above reveals different views about the procurement delays, whether caused by veterinarians' late requests or by inventory management. It followed that participants could not agree on the formula for this indicator, as no 'perfect' formula could actually reflect the complexity of the process and the heterogeneous perspectives involved. Instead of achieving a compromise on the measure, 'dissension' (Hedberg & Jönsson, 1978) stimulated the discovery of a broader problem outside the PMS, i.e. the need to ensure effective coordination between different units (as in the example of the response time).

Similarly to the case analysed by Jordan and Messner (2012), the pressures coming from the incentive system, and particularly the possibility for the targets to be used for compensation purposes, catalysed management attention on the need to find accurate 'formulas' for some performance indicators. In so doing, managers brought in their different perspectives (such as the different views about procurement time in the example above) and no consensus could be achieved, given the impossibility for 'perfect' formulas to be found. However, within Zootech the discussion around the indicators did not make the numbers work. Rather, it led to the discovery of emerging problems and projected managers' attention into something else. This projection entailed the hope that, if such broader problems were addressed in the future, at that (future) point in time the indicators would have worked in practice and been relevant for compensation purposes as well.

It followed that the mechanisms of 'making do' (Andon et al., 2007), and therefore the ways for compensating for KPIs incompleteness and making KPIs work, were projected over time and left to future search. This projection (and therefore the 'time' needed awaiting for future events) suspended the urgency of the compensation pressures around some indicators, since these pressures were 'postponed' by awaiting for future events, and opened up new possibilities. Indeed, managers started to explore opportunities for addressing the emerging problems of coordination through a number of further inter-functional projects. For example, one of these projects included the mapping of the workflows throughout the organizational structure, which could affect factors such as the response time and procurement efficiency. Also, ad hoc projects for administrative simplification and training were planned.

Although these projects spanned beyond the boundaries of the process of PMS design, they ended up being incorporated into it. Indeed, between June and October 2013, PMS design was adjusted to include inter-functional objectives and indicators related to the inter-functional projects within 'Zootech 2014'. These objectives were set up by inter-functional workgroups whose composition depended on the nature of the inter-functional projects. As commented by a biologist (EM4):

“inter-functional groups and projects can help our work by increasing coordination, motivating managers and also facilitating the understanding of our goals. Working together to overcome problems is crucial”.

Within Zootech, PMS design unfolded and generated effects within a complex intermingling between process and outcomes of design. In particular, PMS incompleteness did not cause frustration and did not hinder innovation. Instead, it was compensated by managers’ confident belief in a future possible solution that they could not perfectly see yet but, nevertheless, triggered managerial search.

4.4. Re-examining the past

From November 2013 to January 2014, managers from Health Management and Administrative divisions were invited to meet to review objectives and set targets for ‘Zootech 2014’. These meetings were also attended by a number of managers who participated in inter-functional workgroups. During these meetings, conversation was again triggered by the complexity of some indicators and unfolding memories about them.

An example is provided by a discussion on the indicator ‘number of partnerships established at international conferences’, which measured the achievement of the 2014 objective, ‘strengthen research networking’. This objective was considered strategic for Zootech because the collaboration with other research centres could improve both research reputation and quality. However, during the November meeting, managers could not recall the rationale which guided its choice a few months earlier. As commented on by some managers:

“I don’t remember what we meant by this indicator [...]” (BM1)

“The sense is that the more international conferences we attend, a higher number of new partnerships launched is expected of us” (BM2A)

“Ok, this is clear, but what did we mean by partnerships? If I receive a proposal for collaboration from a Dutch institution three months after the conference that I attended, is that to be considered a partnership?” (BM1).

The SD concluded that,

“we cannot change the indicator thousands of times just because nobody recalls it precisely. We need to involve the Research unit and ask them”.

In this example, the managers’ discussion was triggered by evolving memories about the indicator. Such patterns of forgetting led participants to re-examine previous decisions,

allowing new participants (i.e. the Research unit in the example above) to enter the design process and add new knowledge to it.

As suggested by Cooper et al. (1981, p. 186), by altering interpretive concepts over time, events already experienced can be the basis for new learning experiences as well as lead to the re-examination of past behaviours and their outcomes, even by different people (see also Weick, 1977). Within Zotech, evolving memories of the indicators led participants to re-discuss the knowledge associated with them, letting new participants and perspectives enter the discussion. In so doing, problems were ‘re-punctuated’ (Weick, 1977), as they were seen from different points of view, and ‘new’ problems emerged.

For instance, during a subsequent meeting held in December 2013, participants were examining the inter-functional objective, ‘exploiting innovative and specialised diagnostic instruments’ with the related indicator, ‘completion of a report on new diagnostic instruments to be purchased by the end of the year’. On this occasion, the conversation between one biologist, one chemist, and two veterinarians was fuelled by the need to recall what had to be included in that report:

“I do not know what to write in that report exactly! We didn’t set guidelines or instructions when we decided the indicator” (BM2B)

“[...] It’s just a report, write down the instruments you think your area should have to perform the activity. I remember we decided to list the most technological instruments available on the market” (BM7)

“Ok, but if we write our own list, how are we going to claim that this indicator pertains to an inter-functional objective?” (BM2B)

“But each area has its own peculiarities. I cannot understand what you mean about [instrument A], why do you need it and how will you use it?” (BM5)

“The reality is that everyone knows their own area and speaks their own language.[...] It is difficult to understand why you need this instrument and not another one” (BM7).

The conversation above reveals that, as managers forgot *why* the indicator was chosen to measure an inter-functional objective, participants had the chance to bring into the discussion their individual needs regarding the instruments the organization should invest in. Discussion and confrontation between their different perspectives triggered further discoveries, as managers realised that they were lacking in shared understanding of each other activities. As argued by a chemist:

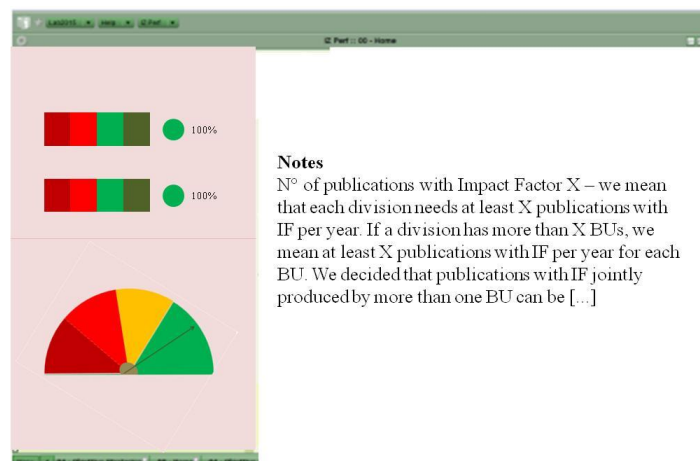
“sometimes, the administrative staff finds it difficult to understand the technical language of veterinarians or chemists. And the other way around. This is our real problem” (BM6).

As suggested by Weick (1977), memory can act as an enemy of creativity by constraining meaning into established categories. In the example above, evolving memories (and the patterns of forgetting) about the indicator stimulated different ways of looking at it, re-punctuating the problem to be addressed (from the report to the lack of a shared understanding between different divisions). This re-punctuation triggered further outcomes.

Indeed, following the conversations stimulated by the incomplete indicators, a major re-structuring of the organization’s IT infrastructure was launched to find more effective ways for storing knowledge and expertise. In particular, a new data processing and visualization system was developed to support strategic decision-making. Through this system the top management was provided with dynamic and real-time reports highlighting a comprehensive and integrated overview on several of Zootech’s business processes. Also, this project was meant to affect PMS design, as managers were asked to include written narratives about the meanings of performance indicators in the new IT infrastructure (an example of narrative is provided in Figure 2). As argued by the IT manager (IT):

“now we provide managers from different backgrounds with a shared language. This is done to facilitate the dialogue on each indicator and to help managers work together without being unduly worried by the indicators that do not strictly belong to their backgrounds. Still, how to find the most appropriate words to describe the key activities and keep the system updated is a challenging process”.

Figure 2. A snapshot of the narratives and software infrastructure for ‘Zootech 2014’ (source: our translation and adaptation from the organisation’s material)



As suggested by the GD:

“we have designed a system which can help us continuously monitor the issues we were mainly concerned about [...] We are more aware of what we have to do but now we have to make an effort to deal with other problems”.

At the end of 2014, PMS design was still incomplete and the discussion still ongoing, as the new IT system revealed the need to further develop a common language.

5. PMS design within Zootech: the time dimension of incompleteness

The experience of Zootech demonstrates the complexity of PMS design as it is triggered by accounting incompleteness and the *time* dimension it embeds. Next, we discuss this dimension in specific relation to structures of hope and belief (Busco & Quattrone, 2018a) in the future, as well as memory and the forgetting of the past (Mouritsen & Kreiner, 2016). We will argue that these structures ‘come together’ in the present, as they engage with the very nature of incompleteness, and trigger the generative outcomes of PMS design.

Incompleteness and hopes for future improvements

Within Zootech, the high uncertainty of R&D outcomes, as well as the urgency and unpredictability of the spread of diseases, made it particularly challenging for managers to find the ‘perfect’ performance indicator and target. These difficulties were related to the technical complexity, high specialisation and diversity of the activities and outcomes that had to be measured. Furthermore, ‘cognitive complexity’ (Ditillo, 2004) was augmented by the need for innovative problem solving to ensure rapid responses to unexpected requests, with high serendipity and unpredictability of outcomes.

Such complexity triggered managers’ discussion on PMS throughout the design process, as well as the search for mechanisms of repair and ‘making do’. These mechanisms were searched through the highly specialised and differentiated groups of expertise (ranging from chemists, to veterinarians and administrative staff), and the possibility to combine their diverse perspectives to make the PMS work. As emphasised by Ditillo (2004), within knowledge-intensive organizations, team interaction between differentiated and specialised expertise is crucial for providing mechanisms for knowledge integration and thereby reduce uncertainty.

However, within Zootech, uncertainty was not reduced. Differently from the findings of Chenhall et al. (2013) and Andon et al. (2007), discussion around performance measures did not stimulate ‘immediate’ mechanisms for making the numbers work. Instead of achieving effective knowledge integration through shared targets or informal mechanisms (Ditillo, 2004), ‘dissonance’ between highly differentiated knowledge persisted. Rather than leading to frustration and closure, the uncertainty of the numbers and the difficulties in finding the ‘perfect’ indicator projected the search for solutions over time. [*“Let’s keep the indicator open to be changed. Now, what do you think about creating a dedicated team?”* – the veterinarian, EM11, quoted above]. This projection meant a shift in managers’ concerns from the need to find an immediate solution for the PMS, to broader problems of coordination and the need for future projects. This did not mean that compensation pressures on PMS were eliminated. Rather, due to the knowledge complexity associated with specific indicators, compensation pressures for these indicators were suspended and projected to a future point in time following the confident belief in a future solution for making the numbers work.

The new projects did not produce effects by providing predictions about technical solutions. Rather they produced effects through the ‘projection’ in the future that they enabled, and the aspirations that they entailed. These aspirations meant that, once the right solution would be achieved, the PMS and related compensation system would have worked well. Through such projection in the future, the uncertainty about the PMS did not inhibit new outcomes, nor stimulated immediate mechanisms of repair. On the contrary, it triggered further design by creating a ‘confident belief’ (Quattrone, 2015) in future improvements and structures of hope (Busco & Quattrone, 2018a) in a future that was not seen as yet. Instead of looking for ‘regimes of truth’ (Mouritsen & Kreiner, 2016, relying on Brown, 2005) by trying to repair the indicators, managers gave space for imaginary ‘regimes of hope’ (Brown, 2005; Mouritsen & Kreiner, 2016), by taking an interest in future projects and directing their attention toward the undefined knowledge and solutions that managers hoped to achieve at some point. We represent these hopes in Figure 3, Point a.

As suggested by Jordan and Messner (2012), evaluative pressures have an influence on managerial attitudes towards incompleteness. Within Zootech, high knowledge complexity associated with structures of hope and beliefs mitigated the urgency for repairing some incomplete indicators and replaced such urgency with a continuous search for ‘something else’ (Busco & Quattrone, 2015). This search was driven by the belief that, once the outcomes of future projects were achieved, these outcomes would also make the numbers work for compensation purposes. As we will discuss next, managers’ projection into the future was

sustained by evolving patterns of memory of the past. These patterns were again associated with the high level of knowledge complexity and the impossibility of achieving effective integration through PMS design.

Memory and forgetting

Similarly to other knowledge-intensive organizations, within Zootech knowledge disparities between experts challenged the managers' attempts to codify and stabilise their knowledge into metrics. This meant that, although performance indicators could provide a 'frame of reference' to store meanings (Ditillo, 2004), the knowledge of the indicators strongly resided in the expertise of the PMS designers and the specific circumstances of the design process, rather than in coded information and in the coding system. Therefore, knowledge complexity and the lack of codification augmented the uncertainty of meanings associated with the indicators, as well as managers' need and effort to retrieve their original meanings. This need stimulated discussion and triggered the design process.

For instance, in the example of the indicator on 'partnerships', the impossibility for the managers to retrieve its original meaning forced them to re-examine past episodes and design conditions. As suggested by Anderson-Gough et al. (2001), the memory of the past is structured by the remembrance of particular episodes and depends on how individuals make sense of these episodes over time. Within Zootech, this sense-making was necessary to try to retrieve the meaning of the indicator and stimulated managers' projection into the past. However, this projection was faint as managers revealed evolving memories about past episodes and conditions. [*"We cannot change the indicator thousands of times just because nobody recalls it precisely..."* – the SD, quoted above].

As highlighted by Mouritsen and Kreiner (2016), patterns of memory and forgetting about past decisions are necessary to open up opportunities for daring projects and innovation. Within Zootech, forgetting about past conditions of design did not inhibit the design process. Rather, it provided the conditions for interrogating the past, creating opportunities for new learning experiences and for re-punctuating the problem always anew (Weick, 1977). Within these patterns, past managers' failures in designing the 'perfect' indicator were 'forgiven' (Mouritsen & Kreiner, 2016) because these failures provided actors with an opportunity to enter the conversation and add their new perspective and specific interest to it. Thus, patterns of forgiving and forgetting did not enable managers to avoid problems, but enabled them to re-punctuate problems in always a different way, thereby creating new knowledge about the indicators.

In the example of the ‘completion of report on new diagnostic instruments’, managers forgot about the way in which they had defined the content of the ‘reports’. Such forgetting enabled actors to add their specific interests and hopes (e.g. about the right instrument to purchase) for the design process, and to re-punctuate the problem anew (e.g. by discovering the need for a shared understanding between different divisions). As the problem was re-punctuated, past failures in PMS design did not inhibit change since they were forgiven. As such, evolving memories did not stimulate new knowledge by storing past experiences, but they triggered new knowledge and hope through their lack, forgetting, and re-composition (see Figure 3, Point b). These patterns stimulated new ‘traces’, as indicators were adjusted to accommodate the evolving stories of the managers, while always remaining incomplete (Figure 3, Point c).

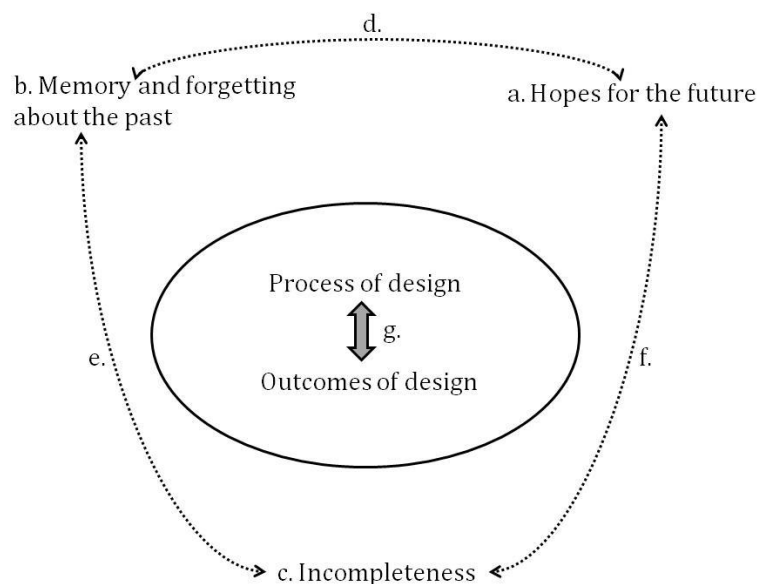
Motivating design through design

Within Zootech, incompleteness engaged managers in ‘productive discussions’ (as in Chenhall et al., 2013; Hall, 2010) and fostered managerial actions (as in Andon et al., 2007). In particular, PMS incompleteness provided the conditions for knowledge complexity to be brought into the discussion, while allowing a pluralism of voices to emerge, problems to be re-punctuated, new actors to enter the discussion, and dissension to persist. Such dissension left space for ‘planned confusion’ (Hedberg and Jönsson, 1978) within which participants’ matters of concern shifted from the indicator itself to a continual discovery, which ended up being re-incorporated into design (e.g. through inter-functional objectives and written narratives).

As argued by Busco and Quattrone (2015; 2018a), a motivating ritual is needed to sustain individuals’ intentions and desires for improvement. Within Zootech, incompleteness in design provided for the motivating ritual that sustained managers’ desire for designing ‘more’. In particular, the structure of hopes in the *future*, memories and the forgetting of the *past* were sustained in the *present* by the impossibility for the managers to reduce knowledge complexity through PMS design (Figure 3, Arrows e and f). Therefore, the outcomes of design were always incomplete, triggering ongoing projections into the past and the future. Such projections led to a constant re-design, as the past decisions on the indicators were partly forgotten and new daring projects for the future were sought out (Figure 3, Arrow d) and re-incorporated into design.

As suggested by Garud et al. (2008), the boundaries between the process of design and its outcomes are blurred as the actors' search, for new ideas to deal with the emerging problems, shapes the design process itself. Also, as highlighted by Weick (2004), regardless of the direction in which designing moves, unfinished design retains tensions and therefore 'life', suggesting new paths for designing 'more' and therefore further possibilities (see also Simon, 1996). Within Zootech, PMS design produced 'impermanent outcomes' (Jelinek et al., 2008) as the outcome of design was always 'to design more', blurring the boundaries between process and outcomes (Figure 3, Arrow g), and thereby providing for the 'motivating ritual' (Busco & Quattrone, 2015; 2018a) which sustained an open-ended design.

Figure 3. The generative power of PMS design (source: our elaboration)



6. Conclusions

This paper has explored the generative power of incompleteness in PMS design by looking into the time dimension of incompleteness. By drawing on the experience of a knowledge-intensive organization, we have shown that the impossibility for managers to design 'perfect' measures and reduce knowledge complexity triggered individuals' projections into the past and the future. These projections enabled new outcomes (e.g. new projects) through intertwined structures of hopes, memory and forgetting. These patterns came together in the present through incomplete performance indicators and an unfolding design process.

This paper adds to the literature on PMS design and incompleteness by demonstrating how incompleteness (and its generative power) entails a ‘time dimension’ as it engages in the *present* with managers’ unfolding visions of the *past* and the *future*. This time dimension is relevant in explaining the generative power of incompleteness. While previous studies have shown the mechanisms for engagement and ‘making do’ triggered by PMS incompleteness, within Zootech such mechanisms were not immediate, but were suspended and projected over time, awaiting for the outcomes of further projects. This projection held the hope that by addressing broader problems and awaiting for future events, performance indicators would work out in practice. Furthermore, opportunities for change and transformation were aided by forgetting and forgiving about past decisions, which enabled new actors enter the design process, as well as further possibilities to emerge. Therefore, structures of hopes in an unforeseen future and forgetting about an imperfect past came together in the present as they engaged with PMS incompleteness, and triggered the generative power of PMS design.

In so doing, we followed Busco and Quattrone (2018a)’s call for more research into structures of hope and belief, and how they maintain an ongoing search for perfection. We did so by showing how these structures are triggered by knowledge complexity and the difficulty to fully capture it through design as well as by the patterns of forgetting and forgiving that this complexity augments. Therefore, we also reinforce the findings of Mouritsen and Kreiner (2016, p. 25) about the need for ‘hiding’ past experiences to enable ‘visionary recoveries’ and aspire towards ‘unrealistic ends’, and we extend these findings to the specific setting of PMS design within knowledge-intensive organizations.

Furthermore, we contribute to the scant literature on accounting and time by highlighting how time structures and incompleteness in design mutually construct each other. Within Zootech, incomplete measures stimulated managers’ sense-making about (and projection into) the past and future. These time projections triggered PMS incompleteness through the unfolding memories, aspirations, and the knowledge gaps that they entailed.

Although our findings derive from the experience of Zootech, they may be relevant for other knowledge-intensive organizations facing the challenges coming from high knowledge complexity and environmental uncertainty. In spite of their extraordinary struggles in dealing with high uncertainty, these organizations should not necessarily seek to reduce such uncertainty. Rather, knowledge complexity can lead to daring outcomes through the time dimension of incompleteness. In this paper, we showed how such dimension can be explored through the patterns of hope, memory and forgetting at work during processes of PMS design. These findings emphasise the particular need for knowledge-intensive organizations to

embrace ambiguity, as well as ongoing questioning and search for solutions, rather than trying to necessarily make the numbers work in the short run.

In this paper we focused on PMS and on the time dimension of incompleteness in PMS design. However, different design artefacts (such as IT systems or financial reports) and spatial arrangements (such as the time-space distance between different users and designers of the PMS) might influence the generative nature of design. In exploring the enabling effects of these artefacts or arrangements, this paper suggests analysing the role of time, through structures of hope (in the future) and memory (of the past), as a way to delve into the generative power of incompleteness.

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Appendix

Table 1. Schedule of meetings

Meetings	Period	Number	Total duration (approx. hours)	Codes of participants quoted in the text
Meetings of the PMS team with the aim to set strategic objectives for 2013-2015	January-February 2013	7	21	
Meetings of the PMS team with executive managers (from Administrative and Health Management divisions) to set 2013 targets	April-May 2013	8	25	EM, biologist, Division 9 (EM9); EM, veterinarian, Division 10 (EM10); EM, veterinarian, Division 11 (EM11).
Meetings of the PMS team with executive and BU managers (from Administrative and Health Management divisions) to review 2014 objectives and set 2014 targets	November 2013-January 2014	6	18	BU, biologist in Division 2 (BM2B); BU, veterinarian in Division 7 (BM7); BU, chemist in Division 5 (BM5); BU, biologist in Division 4 (BM4).

Table 2. Schedule of interviews

Interviews	Code	Number	Total duration (approx. hours)
General Director	GD	3	4,5
Administrative Director	AD	3	3
Sanitary Director	SD	3	3
Head of the Management Accounting unit	MA	4	5
Head of the Human Resources unit	HR	4	4
Executive manager (chemist) - Division 5	EM5	2	2,5
Executive manager (chemist) - Division 6	EM6	2	2
Executive manager (biologist) - Division 2	EM2	2	2
Executive manager (biologist) - Division 4	EM4	1	1,5
Executive manager (veterinarian) - Division 1	EM1	2	2
Executive manager (veterinarian) - Division 3	EM3	1	1,5
Executive manager (veterinarian) - Division 7	EM7	1	1
Executive manager (veterinarian) - Division 8	EM8	2	2,5
Business Unit manager (biologist) belonging to Division 2	BM2A	2	2
Business Unit manager (veterinarian) belonging to Division 1	BM1	1	1
Business Unit manager (chemist) belonging to Division 6	BM6	1	1
Head of the Research unit	RU	2	2
Head of the Purchasing unit	PU	2	2
Head of the IT unit	IT	3	3
Head of the Quality assurance unit	QA	1	1,5
Tot.		42	47